

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

1 1. (Original) A nonvolatile semiconductor memory
2 device comprising:
3 (a) a first insulator film formed above a
4 semiconductor substrate;
5 (b) silicon nitride dots formed on said first
6 insulator film;
7 (c) a second insulator film formed on said silicon
8 nitride dots;
9 (d) a conductive film formed on said second insulator
10 film;
11 (e) first and second semiconductor regions formed in
12 said semiconductor substrate;
13 (f) a channel region located between said first and
14 second semiconductor regions, wherein
15 (g) programming is performed by injecting charges from
16 said channel region into said silicon nitride dots on a
17 first end portion of said channel region on a side of said

18 first semiconductor region or into said silicon nitride
19 dots on a second end portion of said channel region on a
20 side of said second semiconductor region.

1 2. (Original) The nonvolatile semiconductor memory
2 device according to claim 1, wherein
3 said first and second semiconductor regions extend in
4 a first direction, and
5 said conductive film extends in a second direction
6 orthogonal to said first direction.

1 3. (Original) The nonvolatile semiconductor memory
2 device according to claim 1, wherein
3 said first and second insulator films are larger in
4 barrier height than silicon nitride.

1 4. (Original) The nonvolatile semiconductor memory
2 device according to claim 1, wherein
3 said first and second insulator films are silicon
4 oxide films.

1 5. (Original) The nonvolatile semiconductor memory
2 device according to claim 1, wherein
3 injection of said charges into said silicon nitride
4 dots on said first end portion is conducted by carrying
5 electrons from said second semiconductor region toward said
6 first semiconductor region,
7 injection of said charges into said silicon nitride
8 dots on said second end portion is conducted by carrying
9 electrons from said first semiconductor region toward said
10 second semiconductor region,
11 said charges injected into said silicon nitride dots
12 on said first end portion are determined by carrying the
13 electrons from said first semiconductor region to said
14 second semiconductor region, and
15 said charges injected into said silicon nitride dots
16 on said second end portion are determined by carrying the
17 electrons from said second semiconductor region to said
18 first semiconductor region.

1 6. (Original) The nonvolatile semiconductor memory
2 device according to claim 1, wherein
3 said silicon nitride dots are $\text{Si}_x\text{N}_{1-x}$, where $0 < x < 1$.

1 7. (Currently Amended) The nonvolatile semiconductor
2 memory device according to claim 6, wherein
3 The the X in said Si_xN_{1-x} is approximately 0.43.

1 8. (Original) The nonvolatile semiconductor memory
2 device according to claim 1, wherein
3 a surface portion of said silicon nitride dots is
4 higher in nitrogen concentration than a central portion of
5 said silicon nitride dots.

1 9. (Original) The nonvolatile semiconductor memory
2 device according to claim 1, wherein
3 said silicon nitride dots are present as a single
4 layer on said first insulator film.

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1 10. (Original) A nonvolatile semiconductor memory
2 device comprising:
3 (a) first and second semiconductor regions formed in a
4 semiconductor substrate;
5 (b) a channel region located between said first and
6 second semiconductor regions;
7 (c) a first silicon oxide film formed above said

8 semiconductor substrate, and extending from above said
9 channel region toward above said first semiconductor
10 region;
11 (d) silicon nitride dots formed on said first silicon
12 oxide film;
13 (e) a second silicon oxide film formed on said silicon
14 nitride dots;
15 (f) a first conductive film formed on said second
16 silicon oxide film;
17 (g) an insulator film formed above said semiconductor
18 substrate, and extending from above said channel region
19 toward above said second semiconductor region; and
20 (h) a second conductive film formed on said insulator
21 film, wherein
22 (i) programming is performed by injecting charges from
23 said channel region into said silicon nitride dots on an
24 end portion of said channel region on a side of said second
25 semiconductor region.

1 11. (Original) The nonvolatile semiconductor memory
2 device according to claim 10, wherein
3 said first and second semiconductor regions extend in
4 a first direction,

5 said first conductive film extends in a second
6 direction orthogonal to said first direction, and
7 said second conductive film extends in said first
8 direction.

1 12. (Original) The nonvolatile semiconductor memory
2 device according to claim 10, wherein
3 said first and second silicon oxide films are Si_xO_2 ,
4 where $x \leq 1$.

1 13. (Original) The nonvolatile semiconductor memory
2 device according to claim 10, wherein
3 said first silicon oxide film is a thermal oxide film,
4 and said second silicon oxide film is a deposited film.

1 14. (Original) The nonvolatile semiconductor memory
2 device according to claim 10, wherein
3 injection of said charges into said silicon nitride
4 dots is conducted by carrying electrons from said second
5 semiconductor region toward said first semiconductor
6 region, and
7 said charges injected into said silicon nitride dots
8 are determined by carrying the electrons from said first

9 semiconductor region to said second semiconductor region.

1 15. (Original) The nonvolatile semiconductor memory
2 device according to claim 10, wherein
3 said silicon nitride dots are $\text{Si}_x\text{N}_{1-x}$, where $0 < x < 1$.

1 16. (Currently Amended) The nonvolatile semiconductor
2 memory device according to claim 15, wherein
3 The the X in said $\text{Si}_x\text{N}_{1-x}$ is approximately 0.43.

1 17. (Original) The nonvolatile semiconductor memory
2 device according to claim 10, wherein
3 a surface portion of said silicon nitride dots is
4 higher in nitrogen concentration than a central portion of
5 said silicon nitride dots.

1 18. (Original) The nonvolatile semiconductor memory
2 device according to claim 10, wherein
3 said silicon nitride dots are present as a single
4 layer on said first silicon oxide film.

1 19. (Original) The nonvolatile semiconductor memory
2 device according to claim 10, wherein
3 said first and second semiconductor regions and said
4 first and second conductive films extend in a same
5 direction, and
6 said second conductive film extends to be mounting up
7 above said first conductive film.

1 20. (Original) A nonvolatile semiconductor memory
2 device comprising:
3 (a) first and second semiconductor regions formed in a
4 semiconductor substrate;
5 (b) a channel region located between said first and
6 second semiconductor regions;
7 (c) a first insulator film formed above said
8 semiconductor substrate, and extending from above said
9 channel region toward above said first semiconductor
10 region;
11 (d) a first conductive film formed on said first
12 insulator film;
13 (e) a second insulator film formed above said
14 semiconductor substrate, and extending from above said

15 channel region toward above said second semiconductor
16 region;

17 (f) a second conductive film formed on said second
18 insulator film;

19 (g) a third insulator film formed above the
20 semiconductor substrate between said first and second
21 conductive films;

22 (h) silicon nitride dots formed on said third
23 insulator film;

24 (i) a fourth insulator film formed on said silicon
25 nitride dots; and

26 (j) a third conductive film formed on said silicon
27 nitride dots, wherein

28 (k) programming is performed by injecting charges from
29 said channel region into said silicon nitride dots on a
30 first end portion on a side of said first conductive film
31 or into said silicon nitride dots on a second end portion
32 on a side of said second conductive film.

1 21. (Original) The nonvolatile semiconductor memory
2 device according to claim 20, wherein
3 said first and second semiconductor regions extend in
4 a first direction,

5 said first and second conductive films extend in said
6 first direction, and
7 said third conductive film extends in a second
8 direction orthogonal to said first direction.

1 22. (Original) The nonvolatile semiconductor memory
2 device according to claim 20, wherein
3 said third and fourth insulator films are larger in
4 barrier height than silicon nitride.

1 23. (Original) The nonvolatile semiconductor memory
2 device according to claim 20, wherein
3 said third and fourth insulator films are silicon
4 oxide films.

1 24. (Original) The nonvolatile semiconductor memory
2 device according to claim 20, wherein
3 injection of said charges into said silicon nitride
4 dots on said first end portion is conducted by carrying
5 electrons from said first semiconductor region toward said
6 second semiconductor region,
7 injection of said charges into said silicon nitride
8 dots on said second end portion is conducted by carrying

9 electrons from said second semiconductor region toward said
10 first semiconductor region,

11 said charges injected into said silicon nitride dots
12 on said first end portion are determined by carrying the
13 electrons from said second semiconductor region to said
14 first semiconductor region, and

15 said charges injected into said silicon nitride dots
16 on said second end portion are determined by carrying the
17 electrons from said first semiconductor region to said
18 second semiconductor region.

1 25. (Original) The nonvolatile semiconductor memory
2 device according to claim 20, wherein
3 said silicon nitride dots are $\text{Si}_x\text{N}_{1-x}$, where $0 < x < 1$.

1 26. (Currently Amended) The nonvolatile semiconductor
2 memory device according to claim 25, wherein
3 The the X in said $\text{Si}_x\text{N}_{1-x}$ is approximately 0.43.

1 27. (Original) The nonvolatile semiconductor memory
2 device according to claim 20, wherein
3 a surface portion of said silicon nitride dots is
4 higher in nitrogen concentration than a central portion of

5 said silicon nitride dots.

1 28. (Original) The nonvolatile semiconductor memory
2 device according to claim 20, wherein
3 said silicon nitride dots are present as a single
4 layer on said third insulator film.

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1 29. (Original) A nonvolatile semiconductor memory
2 device comprising:
3 (a) first and second semiconductor regions formed in a
4 semiconductor substrate;
5 (b) a channel region located between said first and
6 second semiconductor regions;
7 (c) a first insulator film formed above said
8 semiconductor substrate on said channel region;
9 (d) a first conductive film formed on said first
10 insulator film;
11 (e) a second insulator film formed above said
12 semiconductor substrate on both sides of said first
13 conductive film;
14 (f) silicon nitride dots formed on said second
15 insulator film;
16 (g) a third insulator film formed on said silicon

17 nitride dots; and
18 (h) a second conductive film formed on said third
19 insulator film, wherein
20 (i) programming is performed by injecting charges into
21 said silicon nitride dots adjacent to the both sides of
22 said first conductive film, respectively.

Claims 30-41 (canceled)